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New Urban Transitions towards Sustainability: Addressing SDG Challenges (Research and Implementation Tasks and Topics from the Perspective of the Scientific Advisory Board (SAB) of the Joint Programming Initiative (JPI) Urban Europe)

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Abstract: The paper presents the requirements and challenges of urban transitions towards sustainability from the perspective of the SAB of the JPI Urban Europe. Critical reflections on the achievements and identification of gaps in the activities of JPI Urban Europe, based on the Strategic Research and Innovation Agenda SRIA (2015–2020), reveal advanced research questions, tasks, and approaches that influenced the development process of the SRIA 2.0 (released in February 2019). The authors emphasize the dilemma approach, the local context and the co-creation concept to pursue urban transitions in real-world context. Considering this frame, they propose specific domains for further research on urban transitions.

Keywords: urban transitions; SDGs; dilemma approach; co-creation; local context; SRIA; research priorities

1. Setting the Scene

With this paper, the Scientific Advisory Board (SAB) of the Joint Programming Initiative (JPI) Urban Europe summarizes critical reflections upon the work and the achievements of JPI Urban Europe during the last five years. Based on that, it offers recommendations for the thematic orientation of the new Strategic Research and Innovation Agenda (SRIA 2.0) beyond 2020. The intention is to highlight and prioritize research gaps and weaknesses which shall be addressed in an advanced research setting that is appropriate to mirror and grasp real-urban world challenges. This is in accordance with the vision of the JPI Urban Europe as a "platform to create, combine, discuss and make available knowledge and robust evidence for sustainable urban solutions by setting common research and innovation priorities, improving and aligning research and innovation instruments, moderating science-policy

processes and supporting transnational collaboration for local capacity building" [1] (p. 3). JPI Urban Europe was launched in 2010 with the aim of becoming a transnational hub for research and innovation related to sustainable urban development. It currently encompasses 14 European member states and six observer countries.

The first SRIA, which was adopted in 2015 and ends in 2020, includes five thematic priorities. These are "vibrancy in changing economies", "welfare and finance", "environmental sustainability and resilience", "accessibility and connectivity", and "urban governance and participation" [2] (pp. 26–48). Major parts of these themes were included within five research calls during the last three years (see overview in the Supplementary Materials). Critical reviews of their achievements have been discussed continuously by the SAB of JPI Urban Europe and, most recently, by de Jong et al. [3], as commissioned by the JPI Urban Europe. The reviews yielded evidence of successful and user-oriented research lines, which should be continued, as well as recommendations for research adjustments according to new urban transition challenges. These results have been considered in the preparation of the advanced SRIA 2.0 [4] that has announced four selected research priorities. These are "digital transitions in urban governance", "from urban resilience to robustness", "sustainable land-use and urban infrastructures", and "inclusive public spaces for urban livability". The SRIA 2.0 will last from 2021 to 2026 as the major orientation for future research calls by JPI Urban Europe.

The SRIA 2.0 was launched at a highly participatory Policy Conference, in Brussels, on 12 February 2019. The research priorities will increasingly acknowledge the role of JPI Urban Europe as a well-recognized source of knowledge and robust evidence for informing European and international urban policies. To meet this goal, the combination of high-level urban science results, capacity building and stakeholder mobilization towards advanced urban planning, and urban policy-making for urban transitions will be strengthened. The short- and mid-term objectives encompass urgent urban challenges and research priorities. These refer to ambitious aims postulated in the sustainable development goals (SDGs) as part of the Agenda 2030 [5], with reference to the Paris agreement on climate change [6], the New Urban Agenda [7] and its complement, for the European scale, through the Urban Agenda for the EU, known as the "Pact of Amsterdam" [8], and the Kuala Lumpur Declaration on cities 2030 at the 9th World Urban Forum [9].

Reflecting on the SDGs as guidelines for urban transitions and stressing the importance of the local level to realize urban transitions in real-world contexts, we conclude that co-creation is a decisive mechanism for implementing urban transition pathways. Bearing this in mind, we specify domains for further research. They provide a scientific background of the new SRIA 2.0 of the JPI Urban Europe. To fulfil the ambitious and comprehensive tasks, formulated in the SRIA 2.0, the dilemma-approach has been chosen to acknowledge the complexity, non-linearity, and uncertainty of present and future urban transition pathways. We describe an urban dilemma "as two or more competing goals, such as stakeholder interests and related strategies that potentially fail to achieve their aims, as implementing one strategy hampers or prevents the achievement of another" [4] (p. 14). This approach is innovative, pinpointing the fact that sustainable transitions may not always include win-win situations, but can include making choices and choosing priorities. It can, therefore, be important to identify situations in which dilemmas occur and, on this basis, to develop situations where these are avoided or if this is not possible, where priorities have to be set. There is, however, also a risk that dilemmas are deployed to slow down or hinder the transition processes. Pointing at potential dilemmas and asking for further research can be a useful strategy for an actor who wants to halt sustainability transitions. A balanced approach is therefore necessary. To initiate new urban transitions towards sustainability, honest and brave decisions, changes, and implementations based on co-creation are inevitable, and they question our present decision-making on political, economic, and individual levels. The urban realm can be considered as a perfect stage for achieving societal progress.

To gain these insights, the authors carried out an extensive literature review including European and UN-documents, checked the findings of research projects, and took part in "Agora meetings" with stakeholders from different institutions and cities, organized by JPI Urban Europe. They

intensively exchanged and discussed all observations and outcomes in a cross-referenced manner based on the disciplinary expertise of each author. Commonly, they identified research gaps and formulated recommendations.

2. SDGs as Guidelines for Urban Transitions

The SAB agreed that the SDGs and their targets [5] provide a fundamental orientation for urban development, research, and implementation. Nevertheless, the political character of this document requires translation into thematic priorities for research and innovation, and also for developing adequate principles for co-designing new approaches and for support capacity building among all stakeholders. The SDGs have been proposed to address the current major challenges for global, regional, and local urban development. The importance of the SDGs is based on their political acknowledgement and legitimization. The 17 SDGs and their 169 targets were adopted with the global aim of improving human living conditions, protecting the planet and its resources, and ensuring prosperity for all. They have a clear link with the ambitions of JPI Urban Europe. The vehemence of urbanization in terms of speed, trajectories, and consequences calls for new strategies in accordance with the SDGs. Therefore, among the 17 goals, goal 11 stands out as the most relevant for the mission of JPI Urban Europe: "Make cities and human settlements inclusive, safe, resilient and sustainable". The 10 targets that specify goal 11 describe extensive and diverse topics related to the sustainability of cities and human settlements. Furthermore, they reveal their interrelations with other SDGs, such as goal 1—eradicate poverty; goal 2—eradicate hunger; goal 3—ensure a healthy life; goal 4—provide education and training; but also goal 9—construction of resilient infrastructure; goal 13—responsible dealing with climate change; and goal 15—save ecosystems and biodiversity. Thus, goal 11 can be considered as a node within the SDGs because of its focus on the urban perspective. It encompasses a number of cross-cutting issues that are interlinked with further SDGs in an interlaced network of challenges. Figure 1 illustrates some of the interlinkages between the SDGs. It also illustrates that many important aspects of a sustainable city are not explicitly mentioned in SDG 11, for example, fewer inequalities, safe water and sanitation, and quality education [10]. It, therefore, underlines a key message in Agenda 2030 that the SDGs are connected and undividable, meaning that one cannot choose only one SDG and ignore the others. Sustainable urban development must, therefore, consider all relevant SDGs. Figure 1 describes a schematic structure of how to approach the SDGs from the perspective of JPI Urban Europe. It considers the major overlapping between SDGs and targets, originating from the perspective of SDG 11 as a reference point. Further, it considers the relations of JPI Urban Europe to the other JPIs (e.g., JPI climate). It is an initial draft, showing the role of SDG 11 as a node.

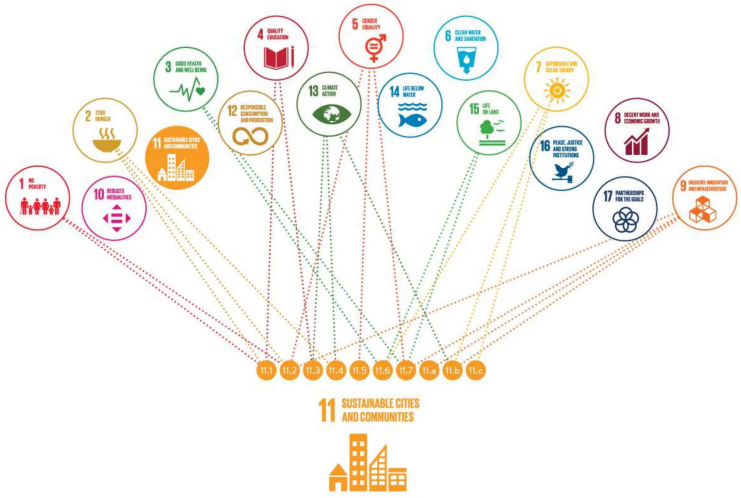

Figure 1. SDG (Sustainable Development Goal) 11 as the entry point to the SDGs overall, showing some of the relevant connections between the SDGs.

The ambitions of and the relationships between the various SDGs have been explored in several recent publications (e.g., Reid et al., Sing et al. [11–15]). Interestingly, more synergies than trade-offs have been found. Examples of synergies include those between targets 11.1 (on housing) and 10.7 (on migration), and between 11.2 (on transportation systems) and 13.2 (on climate mitigation) [16].

To fulfill the SDGs within the fixed period until 2030, we advocate urban transitions and we consider the SDGs as "living guidelines", dedicated to implementation in real-world contexts and to be further enriched. JPI Urban Europe considers urban transitions as fundamental and multi-dimensional alterations of urban development that are required to reach the ambitious targets related to sustainable livelihoods for citizens, by avoiding greater stress on the environment, and fair distribution of economic and natural resources. These phenomena have also been extensively discussed and conceptualized by using the concept of "urban transformations" (e.g., Kabisch et al. [17]; for scientific discourses on transition versus transformation, see Hölscher et al. [18]).

Urban transitions are crucial for fulfilling the SDGs because more than half of the global population is currently living in urban areas and this number continues to grow. In Europe, almost three-quarters of the urban population live in urban areas, and in Latin and Northern America, this figure is approximately 80%. The UN [19] predicts that around two-thirds of the world's population will be living in an urban area by 2050. This rapid pace of change is projected to be driven primarily by changes in Africa and Asia, as the focus of global urbanization patterns continues to shift towards developing and emerging economies. Thus, the challenges of African and Asian urban development, including natural resource use, socio-economic disparities, and climate change causing migration streams, require attention that considers the case-specific context. Therefore, JPI Urban Europe has already reached out beyond Europe by implementing a joint call with the Belmont Forum in 2017, and a second one with NSFC (the National Natural Science Foundation of China). Furthermore, assessment of the possibility for joint activities with Brazil is currently underway. Due to the relevance of internationalization for JPI Urban Europe, more cooperation with selected countries and regions will be seen in the future. In addition, JPI Urban Europe provides room for projects looking at larger transitions, in line with the SDGs, based on a mission-driven approach.

3. The Importance of the Local Context to Pursue Urban Transition

Projects funded by JPI Urban Europe tend to be incremental, focusing on transitions at a smaller scale within the local context. The importance of the local context was particularly emphasized in the Kuala Lumpur Declaration, adopted during the 9th World Urban Forum in 2018 [9]. The local level provides the stage for concrete action and the engagement of various stakeholders. Communities, formal and informal groups, citizens, organizations, and charismatic leaders play a key role. Although city authorities depend on national (e.g., federal/state in some cases) and EU policy in terms of urban planning and management, cities themselves also initiate actions in a self-reliant manner. In a number of cities such as Rotterdam (CO_2-neutral port until 2050) or Oslo (Green Capital of Europe 2019, CO_2-neutral city until 2050), governments and the mayor as key people in decision-making and communication, are strong enablers in pursuing new, local development strategies. This requires honest and brave uncovering of tasks, problems, conflicts, and dilemmas in a transparent way, to find appropriate solutions. Sometimes, painful decisions are necessary to grasp complex problems, which can be approached in the long-term through convincing and transparent package deals [3]. Such actions include a broad, democratically accepted goal-arrangement encompassing citizens' involvement, which is, in turn, anchored in cities' visions and leitmotifs resisting changing political leadership after elections. With regard to research, ambitious and truly inter- and transdisciplinary collaboration is needed. This includes methods, tools, strategies, experiments, and solutions for transitions from different disciplines, but also non-academic knowledge sources such as citizen sciences and the acknowledgement of tacit knowledge. A continuous exchange among all actors, within new academic and non-academic partnerships from the very beginning of a project or program, is essential in terms of co-creation. Realistically available physical, technical, personal, and financial resources, as well as useable local

data, must be considered. This requires respect for already ongoing urban alterations initiated by local stakeholders and offering mutual, useful collaboration.

However, cities' autonomy in representing the local context [20] might not be available to all cities, or their autonomy can only be expanded at the expense of the needs of broader regions. Therefore, their development priorities have to support harmonious development at all territorial levels. Participative governance patterns, power constellations, available financial and personal resources, and institutional support are, in their interaction, decisive influencing factors concerning decision making for multi-level development strategies.

During the last decades, co-creation has been widely promoted as the principal mechanism for bringing about the societal transformations aiming to achieve the various urban sustainability goals. However, although Trencher et al. [21], for instance, described the function of co-creation for sustainability at a specific geographical area or societal sub-system in terms of active engagement of all key actors, co-creation does not simply mean citizen participation. The co-creation for sustainability approach encompasses four tools, namely: top-down approaches, bottom-up approaches, multi-stakeholder partnerships, and collaborative research. The essential sense of co-creation is about accommodating transparent processes as well as the active and reflexive moderation among different stakeholder groups and interests (e.g., Metzger et al. [22]) The key principle pursued is inclusiveness, not just in the sense of tackling marginalization and quality of life per se, but to increase opportunities for all humans to engage in decisions that affect their fate. Noteworthy here is that any activity in urban sustainable development is, by necessity, co-creative [23]. The concept can, thus, be seen as central to the implementation of the SDG 11 and New Urban Agenda aims.

Co-creation is the foundation of the urban living lab approaches on a local level. They can provide effective environments to empower multiple stakeholders in the exploration of novel, open, and robust urban projects and to tackle unsustainable urban situations [24]. Hence, as the GUST (Governance of Urban Sustainability Transitions) project (funded by JPI Urban Europe) defines them, 'Urban living labs can be considered both as an arena (geographically or institutionally bounded spaces), and as an approach for intentional collaborative experimentation of researchers, citizens, companies, and local governments' [25] (p. 4). Since JPI Urban Europe supported urban living labs aim for sustainability through co-creation, it is important to reflect and draw on recent knowledge gathered from practical experience in this field. The JPI Urban Europe-funded project, Guidelines for Urban Labs—URB@Exp [26] (pp. 34–76), defined the following guidelines:

Merging agendas—the need to carefully articulate and discuss the aspirations and purposes of the lab as well as clearly identified points of overlap between them. It is important to highlight how perspectives from formerly excluded groups can be considered.

Avoiding the solutionist trap—the importance of open-minded participation by all those involved in the process and their preparedness to discuss and accept alternative proposals, methods and outcomes.

Shared platform—the need to pay particular attention to the physical location where urban lab management activities take place, in order to facilitate a 'free' atmosphere.

Establishing continuous dialogue—it is vital that participants continuously re-evaluate their agenda and re-formulate the aims in the light of new discoveries.

Fostering plurality—as urban labs engage a range of participants, bringing together a plurality of perspectives is the key to finding new ways of understanding and addressing complex issues.

The research knowledge of the lab environments needs translation and adaptation to the city level and to similar urban environments in other cities—to move from the niche to the mainstream [27]. If this can be achieved, proposals and tests of new institutional integration and the inclusion of living labs as part of wider socio-material configurations seem to be promising [24].

These insights lead to propositions about specific domains for further research on urban transitions. Hence, we first pay attention to new urban policy challenges which should be tackled by research. We then dedicate the second part to conceptual research priorities.

4. Specification of Domains for Further Research

4.1. Responses to the New Urban Policy Challenges

4.1.1. Urban Transitions as a Global Task to Fulfill the SDGs

The SDGs and, in particular, SDG 11 provide the basis and a strong commitment to achieve sustainability throughout urban transitions. There is a need for awareness-raising and concrete action to make cities inclusive, safe, resilient, and sustainable. Fast regional dynamics in urban growth, as well as shrinkage in diverse parts of the world, require transnational and also transferable approaches and strategies within Europe and worldwide, developed with those partners who are most intensively affected. Thus, the global challenges of urban development—natural resource use, socio-economic disparities, digital transitions and climate change induced migration streams—need the greatest attention. The matter of utmost importance is to know practices just applied in cities. There are good examples of both small, shrinking cities like Altena in Germany, and growing metropoles like Paris. The city of Altena focused primarily on controlling decline rather than growth, for which the city welcomed refugees and offered active integration. By doing so the number of inhabitants could be stabilized and the unemployment rate decreased. In 2016, Paris launched the "Let's Reinvent the Grand Paris Metropolis" project. The project enables common initiatives and partnerships of actors from public and private sectors as well as citizens. As an urban innovation pioneer, it brings together local stakeholders to design their metropolitan area sustainably. A vision-driven approach towards urban transitions to reach sustainability provides a strategic framing for context-specific decision-making.

4.1.2. Overcoming Separate Transition Paths

To pursue the transition of the urban system, a comprehensive approach including the combination of separate transition dimensions and paths is necessary. Theoretical and empirical research to explain and better understand resonances and dissonances between different actors and their aims is lacking. More attention should be focused on their history, antecedents, visions, and social compositions. The identification and analysis of organizations and agencies at different scales such as neighborhoods, districts, and citywide can bring these differing transition approaches together. The experiences from the renewal projects in Bilbao, Łódź, Zagreb and many other cities convince us that it is essential to understand what processes and techniques are used to gain synergies and resolve conflicts, tensions, and trade-offs. Moreover, agility, when we face wicked issues with their genuine uncertainty, complexity and the existence of non-knowledge, requires appropriate strategies. The dilemma approach provides a new way of thinking about urban futures.

4.1.3. An Enlarged View on Innovations as a Constituent of Transition

The emerging programs of relevant "innovation-led" applications and experiments must ensure strong relations to societal and cultural components and not focus solely on narrow techno-economic approaches. Technologically advanced systems must be seen only as the tools and they come into line with priorities. For example, the interactive platform in the project Low Carbon Housing Tampere Plus—TARMO+ in Tampere provides information and communication tools for residents, housing companies and service providers, but it is only a technological element of a complex, innovative project, strongly based on participation. An active innovation policy should refer not only to developing new solutions but should also create new coalitions between societal actors and business. It should address various social actors, also hard-to-reach groups and people especially vulnerable and exposed to risks. Furthermore, to disrupt existing systems could include short-term painful decisions that will yield sustainable living conditions in the long run.

4.1.4. Beyond Sustainable Cities? Developing New Urban Imaginaries

Whilst the concept of the sustainable city is still frequently invoked, it now appears to co-exist with a multitude of other urban imaginaries and narratives [28]. There is a need to critically explore whether the concept is consistent with its original use in the Brundtland report or whether there are now significant changes in how the concept is understood and practiced. The examination of the extent to which the current practice of urban sustainability retains its original broader social, economic, and environmental focus, or whether the agenda has a narrower techno-economic focus, such as "digital transitions", is important. This includes the exploration of the potential for alternative and reformulated or hybrid concepts of urban sustainability that draw on debates about just-transitions or no-growth. Although the openness towards new ways of rethinking urban sustainability is acknowledged, the emphasis on the SDGs as orientation for urban sustainable development should not be questioned. As shown in the urban gardening project run by the city of Rome, there is an alternative way of "doing a city". In this project, agriculture is not only a method of a brownfield recovery, but it is also a resource on the way towards social and cultural integration, equality and health.

4.1.5. Urban Integration: Understanding Limits and Exploring Future Potentials

A key feature of the SDGs is their potential for finding new areas of integration between different sectoral objectives and the priorities of different levels of governance and government. Both national and EU regulations emphasize the need for development policies acting on ties not only among the cities but also their functional areas. Numerous obstacles can be named making such resolutions a challenge: inadequate supply of data for precise identification of shortcomings, lack of cooperation among political actors or no legislation addressing critical issues. Yet, paradoxically, given the societal importance of achieving more effective and efficient urban integration, there is no well-understood and widely-shared theoretical understanding of integration. However, there are good examples of urban initiatives—such as "Innova.TO" in Turin. It is the virtuous collaboration between the public employees of the municipality and the local community. They aim at developing innovative ideas into new services and products that can improve the public performances and create both social and economic benefits for the public administration. There is a need to subject integration to more sustained conceptual and empirical scrutiny in order to explore future urban potentials. Within this nexus, three key challenges have emerged: understanding what is already well-integrated in an urban context and why this has been achieved and stabilized; identifying the critical challenges in what is currently not integrated, the wider urban costs and tensions this produces, and the social and technical reasons that explain these disconnections; experimenting with new ways of producing integration through exploratory forums, labs, and demonstrations identifying the wider regime changes.

4.2. Conceptual Research Priorities

4.2.1. Innovative Research Calls

New sets of urban research and innovation challenges (e.g., future of urban employment related to the 4th industrial revolution, urban turbulences and uncertainties causing competition between cities) should claim intellectual leadership in the field of sustainable urban transition. There are also many social processes, such as aging, increasing mobility, and massive transnational migrations, that affect every day urban life. These shifts call for new forms of intergenerational and intercultural solidarity on an urban level. A meta-evaluation, a critical reflection and a strategic synthesis of the major science-based messages, what we have achieved and what really happened in the real-world context, and evaluation of the methodological design used, are all necessary. We need evidence for visible changes, societal impact, and self-sustained continuance. Additionally, 'blue-sky' work, in terms of creative brainstorming within the Agora meetings or at Urban Transition Pathway Symposia (both organized by JPI Urban Europe), could be strengthened by different types of responses, such as

advanced fellowships or high-level workshop calls, with relaxed requirements on co-funding from societal partners and advanced communication tools.

4.2.2. Ongoing Challenges for Co-Creative Approaches

The current challenge of co-creation may no longer depend on underlying technical and methodological issues. Since the participatory turn, a stabilization of techniques and approaches to tailor different kinds of co-productive, co-creative activities has occurred. The crucial issue turns out to be developing long-term trust and reliable networks of understanding and empathy, and thus to essentially "walk the talk". This can foster democratic understanding and influences institutional settings. Furthermore, because of this challenge, it also follows that there is a pressing need for research on co-creative approaches and processes that evaluates and supports the epistemic community with reflexive material.

4.2.3. Measurable Progress in Urban Transformations towards SDGs

The way forward needs measurements from a dedicated performance assessment system including indicators, criteria, and a range of metrics. There is a need for conceptual work to explore how the New Urban Agenda resonates with existing European priorities around smart, livable, resilient, and low carbon cities. Furthermore, the analysis of limitations and potential opportunities of increasingly standardized global urban indicators point at and questions their ability to reflect the contingency and specificity of different urban environs. Thus, a well-defined methodological design, including tailored indicators allowing meaningful comparison between comparable urban environments, is required.

4.2.4. Cross-national Comparative Research Considering the Local Characteristics

Comparative studies enable mutual learning in terms of exchange of experiences and know-how. This includes, worldwide, both north-south and south-north learning centered on the SDGs and the implementation of the New Urban Agenda. And it opens the arena for different types of cities, such as forerunners as well as follower, capitals and second-order cities, large cities and smaller cities, as well as economically poorer towns. It includes growing, shrinking, re-growing or re-shrinking cities illustrating the dynamics and plurality of urban pathways and leaving no-one behind.

5. Conclusions

Contributing to the debate on urban transitions towards sustainability, we as members of the SAB of the JPI Urban Europe have specified SDG 11 among the 17 SDGs as the most relevant, due to its focus on aspects related to the sustainability of cities and human settlements. It is also recognized that SDG 11 encompasses a number of cross-cutting issues that are interlinked with other SDGs. This awareness is crucial, as it requires adopting broader and more comprehensive scientific and practice-oriented approaches to address the challenges, search for solutions and implement policies and actions aimed at achieving urban sustainability. Concerning scientific approaches, we proposed domains for further research, divided in first, responses to new urban policy challenges and second, conceptual research priorities. In terms of practice orientation of research strategies, we recognized the need to strengthen the combination of high-level urban science results, capacity building and stakeholder mobilization towards advanced urban planning, and urban policy-making for urban transitions. Emphasizing the real-world context to realize urban transitions, we have identified the dilemma as a new way of dealing with complexity, non-linearity, uncertainty, as well as competing goals. Furthermore, we stress that co-creation is the decisive mechanism for implementing urban transition pathways by top-down and bottom-up approaches, multi-stakeholder partnerships and collaborative research. In this, particular attention has been paid to the importance of the local context which encompasses policies (decision-making and accountability of the state), administrative embeddedness (local level public administration and policy implementation), and social implication (active participation of civil

society and public engagement). It is thus our core interest in all efforts to initiate new urban transitions towards urban sustainability by upholding the local context.

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